Prepared By:	Approved By:	Approved By:
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*Approval signatures on file with master copy.

Revision Log

1.0 PURPOSE

To establish responsibilities and procedures for preparing and revising engineering drawings and specifications intended for the fabrication or procurement of items for use by the National Synchrotron Light Source (NSLS) or National Synchrotron Light Source II (NSLS II).

2.0 SCOPE

This procedure is applicable to all NSLS and NSLS II formal drawings and specifications that are to be used for the fabrication, testing, inspection, or procurement of items intended for use by the NSLS or NSLS II. In addition, this procedure addresses the preparation of informal drawings.

3.0 POLICY

3.1 Engineering drawings and specifications shall be prepared to document the engineering effort and technical requirements.

3.2 Formal drawings and specifications shall contain all of the detailed requirements necessary to manufacture, purchase, inspect, (and if applicable) test parts, components, or assemblies required for use by the NSLS or NSLS II.

3.3 Informal drawings and specifications may be used for research and development of a part, a system, a fabrication process, or technique.

3.4 Formal drawings and specifications shall be prepared in the standard NSLS or NSLS II drawing or specification format prior to release for fabrication or procurement, and include the approvals from individuals listed in Table 1. The Responsible Engineer, dept. designee, or scientist (if applicable) shall review each new formal drawing and/or specification, and all major changes to existing drawings and specifications to determine whether the new document or change could have an impact upon existing equipment design parameters, changes in cost, schedule milestones, or the ESH&Q Risk Level.

3.5 An Engineering Change Request (ECR) will be required to initiate a revision to a formal drawing or specification that has achieved "completed and ready for use" status, and is designated with an ESH&Q Risk Level of A1 (critical) or A2 (major).
Note: ECRs will not be required for A3 (Minor) or A4 (Negligible) drawings or specifications.

3.6 An Engineering Change Request (ECR), prior to being converted into an Engineering Change Notice (ECN) must be reviewed and agreed upon by selected individuals and if feasible, by the responsible individuals that reviewed the original design. The ECN must then be approved by individuals listed in Table 1.

3.7 Engineering Change Notices shall provide effectivity information and clearly state whether the change must be incorporated into items already produced or procured, as well as items that are in the process of being produced or procured**.**

3.8 The NSLS or NSLS II Design Group will oversee any and all changes to the completed master of engineering drawings in accordance with this procedure.

All changes to completed drawings or parts lists shall be reviewed by an NSLS or NSLS II Design Group reviewer/checker and approved by the responsible engineer/scientist/dept. designee.

3.9 Completed original drawings, specifications, and ECNs must always remain under the strict custody of authorized NSLS or NSLS II Design Group personnel/dept. designee, except NSLS II ECNs, which shall remain under the custody of the NSLS II Configuration Manager.

The NSLS or NSLS II Design Group Supervisor or dept. designee shall make certain that completed originals of all engineering drawings, parts lists, specifications, ECNs, are stored in a controlled master file that is accessible only to authorized NSLS or NSLS II Design Group personnel, except NSLS II ECNs, which shall remain under the custody of the NSLS II Configuration Manager.

The NSLS or NSLS II Design Group shall also maintain a duplicate up-to-date file of these documents which is to be remotely located from the NSLS and NSLS II Design and Master File rooms.

3.10 The NSLS or NSLS II Design Group shall retain sufficient documentation on file to enable them to track the complete revision history of any engineering drawing or specification.

4.0 REFERENCES

4.1 "Graded Approach for Quality Requirements" (SBMS)

4.2 "Drawing and Specification Distribution", DL-QAP-0404

4.3 "Engineering Design Plans", DL-QAP-0411

4.4 "Design Reviews", DL-QAP-0412

4.5 "Light Sources Directorate Specification Form", QF-043

4.6 "**Engineering Change Request/Notice (ECR/ECN)**", QF-010

4.7 "**Engineering Change Request/Notice (ECR/ECN)- Continuation Sheet**", QF-010A

5.0 DEFINITIONS

5.1 **Design Review** - A detailed review of a system, subsystem, or assembly conducted by a group having expertise in the science or technology involved.

5.2 **Drawing or Specification** - A document setting forth pictorial and/or descriptive language and representation of a process, a part, component, or assembly.

5.3 **Effectivity Point** The point at which a change is to be implemented; usually designated by a serial number or a date.

5.4 **Engineering Change** - Any design change that will require a revision to an existing engineering drawing, or specification.

5.5 **Engineering Change Request (ECR) -** A document that is used to request changes to engineering drawings, specifications, or associated documents.

5.6 **Engineering Change Notice (ECN) -** A document that is used to communicate to affected organizations that an engineering drawing, specification, or associated document has been revised in some manner, and that action, as indicated on the ECN, is required.

5.7 **ESH&Q Risk Level** - An indicator using a weighted scale that is used once the ES&H and programmatic risks have been evaluated, e.g., A1 (Critical), A2 (Major), A3 (Minor), and A4 (Negligible).

5.8 **Formal Drawing or Specification** - A completed engineering drawing or specification which has been checked and incorporates all of the required approvals. Such documents contain sufficient detailed information necessary to manufacture, purchase, inspect, and if applicable, test parts, components, or assemblies.

5.9 **Informal Drawings** - An engineering drawing which is used solely for the purpose of testing a part, a system, a fabrication process, or technique. Such documents may be used for the procurement or manufacture of a limited number of parts components or systems.

5.10 **Responsible Engineer or Scientist** - Specific individual assigned technical design or scientific responsibility for an item, research activity, or function.

6.0 PROCEDURE

6.1 Formal Drawing Preparation

6.1.1 The responsible engineer/scientist/dept. designee shall provide the NSLS or NSLS II Design Group with all the information necessary to prepare an engineering drawing including the ESH&Q risk level of the part, component, assembly, subassembly, or system to be drafted.

6.1.2 A designer or draftsperson shall prepare the drawing in accordance with proper format and standards (For NSLS see "Drawing Requirements Manual", for

NSLS II see "Design Room Standards" Manual). Uppercase letters will be used to indicate the drawing revision level. Initial drawings will begin with revision "A".

6.1.3 The designer/draftsperson shall sign his/her name in the "Drawn By" box on the drawing approval form and notify the responsible engineer.

6.1.4 The responsible engineer/scientist/dept. designee will review the drawing to make certain that it depicts what he/she wants. When the Responsible Engineer/scientist/dept. designee is satisfied, the drawing is forwarded to a NSLS or NSLS II Design Group reviewer/checker.

6.1.5 A reviewer/checker shall review the drawings to make certain that the calculations, descriptions, and notes are unambiguous, correct and complete, and the drawing conforms with the proper NSLS or NSLS II format and standards. When the drawing is satisfactory to the person performing the reviews, he/she will sign his/her name in the "Reviewed/Checked By" box on the drawing approval form.

6.1.6 The NSLS or NSLS II Design Group Supervisor or designee will present the drawing to the responsible engineer/scientist/dept. designee for his/her review. The responsible engineer/scientist/dept. designee will review the drawing for ease of manufacture and inspection, special handling, age control requirements, etc.

6.2 Specification Preparation

6.2.1 The responsible engineer/scientist/dept. designee shall have the responsibility for preparing the specification in the proper NSLS or NSLS II Specification format.

6.2.2 The responsible engineer/scientist/dept. designee shall indicate the ESH&Q risk level on the specification and sign his/her name in the "Written By" column on the revision control sheet.

6.3 Informal Drawing Preparation

Note: Drawings with an ESH&Q risk level of A1/A2 may not be classified as "Informal".

6.3.1 The responsible engineer/scientist/dept. designee may prepare or request that the NSLS or NSLS II Design Group prepare an engineering drawing for the sole purpose of testing a part, a system, a fabrication process or technique.

6.3.2 The engineer, designer or draftsperson may prepare the drawing in the same format used for formal drawings and include his/her name in the "Drawn By" box and notify the responsible engineer/scientist/dept. designee, if applicable.

Note: For NSLS, Informal drawings shall have drawing numbers that clearly identify them as informal drawings. For NSLS II informal or pre-released drawings, a revision number shall be used to identify them as informal drawings. Initial drawings will begin with revision "1". Once the drawing becomes a formal drawing, the revision will be changed to the letter “A”.

If the formal drawing format is not used, the drawing shall still contain the following information: drawing title, date prepared, draftsperson's name, the name of the responsible engineer/scientist/dept. designee, and the ESH&Q risk level (A3 or A4).

6.4 Review and Approval of New Formal Drawings/Specifications.

6.4.1 The responsible engineer/scientist/dept. designee will submit the drawing or specification for review to the other involved disciplines and/or personnel and solicit comments concerning the design, producibility, interfaces, interferences, calculations, etc.

6.4.1.1 As a minimum, the drawing or specification shall be submitted for review to the NSLS Engineering/Scientific Section Head or NSLS II Group Leader.

6.4.1.2 The NSLS Engineering/Scientific Section Head or NSLS II Group Leader shall review the drawing or specification to determine if the ESH&Q risk level is correct and whether it could have a significant impact upon any NSLS or NSLS II project design parameters.

6.4.1.3 Design reviews, in accordance with DL-QAP-0412, must be scheduled for the design of all assemblies, systems and major components having an ESH&Q risk level of A1 or A2. Design reviews may be scheduled for items having an ESH&Q risk level of A3 due to a potential safety hazard, uniqueness of design, construction techniques, or environmental impact. Refer to DL-QAP-0412, "Design Reviews" for specific information on this topic.

6.4.2 The individuals who have been requested to review the drawing or specification shall submit their comments to the responsible engineer/scientist/dept. designee in the form of a marked-up drawing, specification, or memo.

6.4.3 The responsible engineer/scientist/dept. designee shall review the comments and either incorporate the suggested changes into the drawing or specification or confer with the individual(s) who proposed the changes to resolve any outstanding issues.

6.4.4 The responsible engineer/scientist/dept. designee will, after the resolution of all changes suggested by the reviewers, obtain the appropriate approval signatures in accordance with Table 1 of this procedure.

6.4.5 The NSLS or NSLS II Design Group Supervisor or dept. designee, after obtaining a distribution list from the responsible engineer/scientist/dept. designee, will arrange for the reproduction and distribution of copies of drawings or specifications in accordance with DL-QAP-0404, "Drawing and Specification Distribution".

6.5 Review and Approval of Changes to Formal Drawings/Specifications

6.5.1 Any individual recognizing the need for a drawing or specification change with an ESH&Q risk level of A1 (Critical) or A2 (Major), may prepare an Engineering Change Request/Notice (ECR/ECN) Form. The originator, together with the responsible engineer/scientist/dept. designee, shall enter all the data applicable for the requested change on the ECR form. The names of affected individuals will be listed in the distribution section of the form. The completed ECR form shall be delivered to the NSLS Design Group or the NSLS II Configuration Manager for processing and distribution.

6.5.2 The NSLS Design Group or the NSLS II Configuration Manager shall assign an ECR number to the change request. The NSLS Design Group or the NSLS II Configuration Manager shall maintain the ECR/ECN log which shall contain, at a minimum, the ECR/ECN number, ECR date, ECN date, drawing or specification number, and the name of the responsible engineer/scientist/dept. designee.

6.5.3 The NSLS Design Group or the NSLS II Configuration Manager shall prepare and distribute copies of the ECR with all continuation sheets, affected drawings and specifications to the responsible engineer/scientist/dept. designee, the NSLS Engineering Section Head or NSLS II Group Leader, the Quality Representative, the NSLS II ES&H Coordinator, and all the individuals whose names appear within the ECR Distribution box. Copies of the ECR, together with all pertinent documentation, may also be submitted for review to other individuals designated by the responsible engineer/scientist/dept. designee or the NSLS Engineering Section Head or NSLS II Group Leader.

6.5.4 Each recipient of the ECR shall review the document for:

- technical adequacy, clarity, and completeness;
- effect on drawing or specification requirements;
- interference and interface problems with other components, assemblies, systems, etc.;
- effect on form, fit or function;
- effect on reliability, maintainability or availability;
- effect on environment, safety, health, and quality;
- effect on interchangeability;
- effect on producibility and quality;
- effect on tooling, fixtures and measuring equipment;
- effect on cost;
- effect on schedule;

- selection of effectivity point (e.g. serial number, lot number, date, etc.);
- other appropriate items.

The NSLS Engineering Section Head or NSLS II Group Leader or dept. designee shall also review the ECR distribution list to ascertain that all groups and individuals that may be impacted by the change have been included in the distribution.

6.5.5 Each recipient of the ECR shall attempt to resolve any questions or concerns, first with the responsible engineer/scientist/dept. designee, and then if needed, the NSLS Engineering Section Head or NSLS II Group Leader. The responsible engineer/scientist/dept. designee shall provide ECR revisions to the NSLS Design Group Representative or the NSLS II Configuration Manager for circulation to all recipients.

6.5.6 Each recipient of the ECR package shall, after reviewing the documents, indicate his/her agreement or disagreement by either initialing or signing the copy of the ECR and then returning the copy to the NSLS Design Group/dept. designee or the NSLS II Configuration Manager. All recipients must agree with the ECR in order for it to become an Engineering Change Notice (ECN).

Note: Disagreements concerning ECRs that cannot be resolved shall be the subject of a meeting attended by all recipients, or their dept. designee, who will attempt to resolve the impasse.

6.5.7 The NSLS Design Group Supervisor or the NSLS II Configuration Manager, or dept. designee will make certain that all ECR copies sent for review have been returned and that all the recipients are in agreement. In the case where there is a disagreement, it is the responsibility of the NSLS Design Group Supervisor or the NSLS II Configuration Manager, or dept. designee to notify the responsible engineer/scientist/dept. designee so he/she may resolve the issues, or to review the merits of the ECR and determine if it would be beneficial to initiate a new ECR to correct the cause of the disagreement.

The NSLS Design Group Supervisor or the NSLS II Configuration Manager, or dept. designee will initiate follow-up action to assure that ECRs are reviewed in a timely manner.

6.5.8 When all the reviewers are in agreement, the NSLS Design Group Supervisor or the NSLS II Configuration Manager, or dept. designee will convert the ECR into an ECN. This is accomplished by crossing out the word "Request" and the abbreviation "ECR" on the original form, which will retain the same identification number.

6.5.9 The NSLS Design Group or the NSLS II Configuration Manager, or dept. designee will circulate the original copy of the ECN to the individuals who are responsible for approving it (see Table 1) and they will sign the form in the appropriate locations. The original form containing the approval signature will be returned to the NSLS Design Group Supervisor or the NSLS II

Configuration Manager, or dept. designee.

If the NSLS Engineering Section Head or the NSLS II Group Leader determines that the change would have a significant impact upon NSLS or NSLS II design parameters or schedule, or has an ESH&Q risk level of High (A1-Critical), he/she shall present the ECN document and supporting justification to the NSLS Department Chairman or NSLS II Division Director, or dept. designee, for approval.

6.5.10 The NSLS or NSLS II Design Group shall maintain an up-to-date file on drawings, part lists, specifications, and ECNs that will always enable them to track the complete revision history of each drawing and specification.

6.5.11 The NSLS or NSLS II Design Group will incorporate the change into the engineering document referencing the ECN number in the revision section. Whenever an engineering document is revised, the revision letter must be advanced.

The responsible engineer/scientist/dept. designee or the NSLS Engineering Section Head or NSLS II Group Leader must have his/her initials included within the revision box for each revision to a formal drawing. Their signature must also be included in the approval form for the revised drawing(s) to achieve release status.

- If the NSLS or NSLS II Design Group cannot incorporate the contents of an ECN into the affected engineering documents in a timely manner, the ECN may be distributed by itself to initiate the actions required by the ECN. The NSLS or NSLS II Design Group will annotate the original of the engineering document awaiting revision to make certain that the document is not issued without the ECN number(s) included in the ESH&Q Risk Level/Outstanding ECNs box.

The annotated documents and ECN may be distributed together to those persons needing change information prior to the availability of the revised engineering documents.

NOTE: No more than two outstanding ECNs may accrue against any engineering document without a revision being made to the document incorporating the change.

6.5.12 The recipient of revised or new engineering document(s) shall ensure that all documents made obsolete or superseded by the revision are removed from current files and/or work places and returned to the NSLS or NSLS II Design Group promptly. If the recipient of the revised engineering document wishes to keep the former obsolete or superseded copy, he/she shall mark that copy "obsolete see revision" and return the accompanying distribution memo to the NSLS or NSLS II Design Group stating the obsolete document(s) are being kept.

6.6 In case of an emergency or unsafe condition, or when it is imperative to implement a change immediately because of a recognized severe adverse impact on schedule, or in unique situations that will cause severe hardship, the ECR/ECN can be processed concurrently with the implementation of the change. The Responsible Engineer/scientist/dept. designee, NSLS Engineering Section Head, or dept. designee or NSLS II Group Leader ensures that the paperwork matches the change.

TABLE 1

Formal Drawing, Specification, and ECR/ECN Approval Signatures

A.	**Initial Release of Formal Drawings**
	The following names are to appear in the **Drawing Approval Box** and their signatures must appear in the **Drawing Approval Form**: • Designer • Reviewer/Checker • Responsible Engineer/scientist/dept. designee • NSLS Engineering Section Head/dept. designee or NSLS II Group Leader • Vacuum Engineer (as applicable) • Quality Engineer (NSLS II Only) • ES & H Coordinator (NSLS II Only)
B.	**Initial Release of Specification**
	The following signatures are to appear on the Specification Revision Control Sheet: • Responsible engineer/scientist/dept. designee • NSLS Engineering/Scientific Section Head or NSLS II Group Leader • Quality Engineer (NSLS II Only) • ES&H Coordinator (NSLS II Only)
C.	**Revision of Formal Drawings**
	The following names are to appear in the drawing approval box and their signatures must appear in the drawing approval form: • Designer • Reviewer/Checker • Responsible engineer/scientist/dept. designee
D.	**ECR/ECN**
	The following approval signatures are to appear on the ECR/ECN Form: • Requestor • Responsible engineer/scientist/dept. designee

	• NSLS Engineering Section Head/dept. designee or NSLS II Group Leader • Quality Representative/dept. designee • NSLS Department Chairman*/dept. designee or NSLS II Division Director* • ES&H Coordinator (NSLS II Only)
E.	**Revision of Formal Specification**
	The following signatures are to appear on the Specification Revision Control Sheet: • Responsible engineer/scientist/dept. designee • NSLS Engineering/Scientific Section Head or NSLS II Group Leader
*Signature required where ESH&Q risk level is A1 (Critical).	

Top of document

Document Review Frequency	
3	Years

Review signatures on file with master copy of controlled document

LIGHT SOURCES DIRECTORATE REVISION LOG

Document Number:	DL-QAP-0403
Subject	Preparing and Revising Drawings and Specifications

Rev	Description	Date
A	Initial Document for Light Source Directorate – see LS-QAP-0403	5/15/2008